UDC 332.14

Sergey Polbitsyn,
doctor of Economic Sciences, professor,
Ural Federal University named after the first President of Russia B.Yeltsin
e-mail: s.n.polbitsyn@urfu.ru
Ekaterinburg, Russia

AGRIINOVATION SYSTEM FORMATION IN NORTHERN REGIONS OF RUSSIA: FOOD SECURITY AND RURAL DEVELOPMENT IMPLICATIONS

Abstract:
The article examines development of food security for the population of northern regions in Russia. To reach the goal of regional food security and to change the declining trends in production, it is necessary to develop innovative agrifood system model to ensure the priority of social goals over economic development, because providing higher standards of rural livelihood will inevitably lead to sustainable development of agricultural production. The agriinnovation system model should be viewed as a model for the provision of public goods or services. Public goods or services have no value, they are consumed for free; but they do have a cost, since the territorial government spends a certain amount of its resources on creating public goods. The article describes a conceptual model of the agri-innovation system developed for Russian northern regions, which would stimulate quality food production. To reach the goal of maintaining regional food security and to address the issue of the downward trend in food production it is necessary to ensure the priority of social goals over economic development. Providing higher standards of rural livelihood will inevitably lead to the sustainable development of agricultural production. Our study determined the conceptual foundations of sustainable development of rural localities of the Russian Arctic regions, to be accomplished through the creation of decent living conditions and the participation of the rural population in quality food production.

Keywords:
Agrifood system, rural development, northern regions, Russia.

Статья подготовлена при финансовой поддержке программы УрО РАН №14 «Фундаментальные проблемы региональной экономики», проект №15-14-7-13 «Сценарные подходы к реализации уральского вектора освоения и развития российской Арктики в условиях мировой нестабильности».

1. INTRODUCTION

The political system of the Russian Federation inherited the Soviet tendency to give more power and resources to the federal government rather than to municipal authorities, causing greater involvement of the federal and regional administration in local agrifood systems.

The Soviet regional food system aimed at providing sufficient amounts of basic food for the population. Even now, after the collapse of the Soviet Union, the major food security principles of Russia are focused on the availability of basic foods (Boycko *et al*, 1995).

However, the stated principles of food availability do not affect the food quality required by the population, and today more and more researchers and practitioners raise this question (Gregory, 1990).

Nowadays, the existing system of food production and distribution in Russia cannot be termed sufficient and productive (Goldman, 1992). Modern requirements of the food system, such as agricultural productivity improvement and rural poverty reduction, cannot be achieved within the post-Soviet type of agricultural policy. Any innovative agrifood system must provide not only basic food but also the whole range of special food types required by the population in the northern regions (Aleksandrova L, Kireyeva N., 2012). However, the practice of agricultural production in Russia is based on the Soviet agrifood system model, which is mostly suitable for southern and central regions of Russia (Anfinogentova, 2013). To reach the goal of regional food security and to change the declining trends in production, it is necessary to develop innovative agrifood system model to ensure the priority of social goals over economic development, because providing higher standards of rural livelihood will inevitably lead to sustainable development of agricultural production.

This paper is structured as follows. First, the theoretical basis of agriinnovation systems is considered; then a general review of the literature on the development of the Russian agrifood system, with an emphasis on regional food systems and rural localities. Finally, the case of Arctic Urals is discussed, including the factors which have affected the formation of the local agriinnovation system.

2. THEORETICAL FOUNDATIONS AND METHODOLOGY

A theoretical model of the regional agrifood systems, which will allow us to determine the perspectives for innovative development, cannot be built without a systematic analysis of development of the agriculture and food distribution system in the region, especially when it comes to a predominantly industrial one.

The concept of an agriinnovation system appeared in the early 2000s as a response to food production crises. The initial idea was to develop innovative agrotechnologies to improve the competitiveness of small producers in developing

countries (Turgul Temel *et al*, 2003). This concept was supported by the World Bank (2006, 2009) in numerous publications.

Further, researchers paid more attention to the essential institutional changes of agrifood systems as the basis for adoption of innovative systems (Laurens Klerkx, Noelle Aarts, Cees Leeuwis, 2010).

Another point of view focuses not on food production, but on food consumption. The transformation of an agrifood system must provide consumers with food of required quality and keep them better informed about it (P.M. (Nel) Wognum *et al*, 2011)

Considering the experience of different countries which were trying to modify their agrifood systems, we have to mention the innovative development of agricultural systems in the new member states of the European Union (Horlings, Lummina G. and Marsden, Terry Keith, 2014).

The innovative model of a regional agrifood system has to be closely related to the climatic conditions of the territory in question and to its historically-developed way of life and human activity; therefore, it should rely not only on agricultural traditions but also on those of food consumption (Zalivcheva O., 2013).

The identification and implementation of the economic capacity of the northern Russian regions must be based on an analysis of both prospective and historical developments of the regions. Therefore, historical knowledge is not only essential to understand the territorial model of agriculture, and to forecast its development; it is also an important component in the management of the territorial development, particularly in the sphere of regional food security (Thomas Herzfeld *et al*, 2014).

To determine a prospective agriinnovation system model we need to consider not only the economic capacity of the region, but also demographic factors, which are characterized by the two following trends: the decline in the rural population; and the sharp increase in the urban or industrial population, caused by migration from this or other.

Thus, there are three main factors that influence the agriinnovation system model in these northern regions:

a) the climatic characteristics of the region;

b) the growth prospects of local (regional) food markets; and,

c) local agricultural and food consumption peculiarities.

It may be noted that differences in the northern regions are defined by differences in the relative strengths of these factors; and, assuming that regional industrial development leads to the creation of new local food markets and growth of existing local markets, we should conclude that the difference in industrial development should result in a fluctuating change in the agrifood system model in the.

First and foremost, when considering the process of agriinnovation system formation, it is necessary to outline the key principles of the regional agriinnovation system model:

1. The nutritional needs of the population in northern regions differ from those of the populations in southern regions. These needs are determined by harsh climatic conditions and demographic factors; these lead to an increased need for protein and fat components in the diet, and higher consumption rates of protein, fat, carbohydrates, vitamins, and macro- and micronutrients (Hasnulin et al, 2006).
2. The forecasting of the demand and changing needs of the population of the northern territories should be made within the territorial information subsystem of the agrifood system. Industrial development of the region will lead to a dramatic increase in the population and, hence, an increase in food consumption. To predict changes in food consumption a special information system must be developed (Zalivcheva O., 2013).
3. Regional and local authorities should play a key role in: collecting data on the population's food requirements; conducting information analysis; and forecasting any changes in these spheres. Currently, local authorities do not monitor the population's requests for food, and do not make any forecast of food needs. This can lead to food shortages (Pirjo Honkanen, Lynn Frewer, 2009).
4. Food supply should be divided into internal and external sources of food because regional food security depends mostly on external sources. Supply from external sources must be monitored by the local government to avoid any food shortages.
5. Local internal food production should be focused on agricultural production, characterized by specific qualities which can be used to justify premium pricing and higher production costs.
6. Rural settlements in northern regions should be developed according to the principles of multi-functional development, meaning that agricultural production should not be the sole source of income for the rural population.
7. Income levels and living standards of the rural population must be comparable with the level of income and standards of living of the urban population; this would have a positive effect on the stability of the socio-economic situation in most rural areas.
8. The regional agrifood system must provide social and economic benefits to all regional social groups. The effectiveness of the agrifood system for urban populations must be provided for, together with a better level of food security. The living standards of the rural population must also be raised.

In the process of agricultural development in the region, local farms must apply not only new agro-technologies, but also new forms of management. The essence of the proposed approach to the creation of any new agrifood system model is to recognize the need for the joint efforts of the various participants in

agricultural production and the food market, in order to effectively achieve the common goal of sustainable food security.

The effectiveness of the agrifood system in the region can be evaluated within the framework of the model, based on the definition of the functional relationship between the public welfare and the efficiency of regional and local authorities, acting under the constraints of limited resources.

The assessment of commercial organizations' performance, as well as that of government bodies and local governments, is difficult, due to the differences between commercial organizations and municipal bodies or public authorities in relation to human welfare. The social welfare function (Arrow, 1950) is considered as a set of individual utilities of all individuals constituting the population. Thus, it is essential to view welfare as including the welfare of all individuals. Therefore, all actions of government bodies and local authorities should be targeted at achieving justice; that is, at improving or at least maintaining the welfare of every member of the society. This problem can be represented as the maximization of social welfare functions by optimizing the enhancement of individual well-being.

The agriinnovation system model should be viewed as a model for the provision of public goods or services. Public goods or services have no value, they are consumed for free; but they do have a cost, since the territorial government spends a certain amount of its resources on creating public goods.

The purpose of our research is to identify the innovative development of rural economic systems and their transformation to agriinovation systems.

To reach this goal we implement the indicative analysis, as the most reasonable and effective method of comparative analysis.

Nowadays indicators are widely used to define innovation policy and evaluation of effectiveness of innovations systems by different national and international organizations. First to be mentioned is the Organization for Economic Cooperation and Development, suggested to imply indicators in scientific research. European Union suggested the annual Innovation Union Scoreboard to provide a comparative assessment of the research and innovation performance of the EU Member States and the relative strengths and weaknesses of their research and innovation systems. The World Bank presented the Knowledge Economy Index[1], comprising three key variables: Economic Incentive and Institutional Regime, Education and Human Resources, Innovation System.

Officially introduced indices provide researchers with mostly general information. However they are not helpful to solve specific problems, such as agriinnovation development. D. Spielman introduced Agriculture, Development and Innovation Index (ADII). The researchers created the basis for index analysis for agriinnovation development based on this index.

[1] URL for this page: http://go.worldbank.org/SDDP3I1T40 (as of 28 March, 2016).

The groundwork of the suggested method of index calculation is the comparison of actual indices with benchmarking values to make strategic decisions on innovation development and evaluate their effectiveness.

The indicators system is based on the following principles:

- index must comply with the general methodology and principles of statistical information, implemented by national census agencies;
- similar indicators must be calculated using similar methods;
- index must give agricultural organizations quality information on social and economic processes in regions;
- selection of indicators must comply with goals of formation and development of regional agriinovation system;
- index must provide researchers and practitioners with reliable information on regional agricultural and food markets;
- index must provide potential investors with reliable and comprehensive information, necessary for adoption of qualified investment decisions..

The Agriinnovation System Index (ASI) is introduced to provide reliable information on all elements of agriinnovation systems.

The methodology of ASI calculation is based on Oslo's Manual principles, which is recognized by most of national census agencies as the official methodological document.

The first group of indicators is designed to describe the first element of agriinnovation system, namely research and educational sector. The purpose of this group to provide quantity information on the level and enlargement of research and education in region. The following indicators were chosen as the key indicators:

1. The number of researchers in the area of agriculture and rural development per billion rubles of GRP. According to the World Bank methodology GRP must be measured in US dollars, but pursuing the goal to analyze the innovation development of Russian regions we decided to use Russian rubles as a primary currency.
2. Quality of agri-education system. It was evaluated by expert survey. Grades may change from 1 to 10. Grades more than 7 are treated as satisfactory.
3. Quality of research institutions It was evaluated by expert survey. Grades may change from 1 to 10. Grades more than 7 are treated as satisfactory.
4. Indicator of government subsidies for research organizations of agriinnovation system. It is calculated as a ration of total amount of subsidies per billion rubles of GRP.
5. Indicator of government subsidies for educational organizations of agriinnovation system. It is calculated as a ration of total amount of subsidies per billion rubles of GRP.
6. Indicator of participation of regional researchers in national agriinnovation system. It equals "1" if researchers participate and "0" if they don't.

7. Accessibility of education in rural territories. The indicator measures the accessibility of the secondary education and has grades from 1, when only primary education is accessible, to 10, when all forms of education are accessible.

The second group of indicators is dedicated to institutes of agriinnovation system. The main objective of these indicators is to show the readiness of the government to support institutional changes and development of agriinovation system. This group includes the following indicators.

8. The price to start-up new business in agriculture. Ideal price is supposed to be equal to zero.

9. Indicator of government subsidies for financial organizations of agriinnovation system. It is calculated as a ration of total amount of subsidies per billion rubles of GRP.

10. Indicator of government subsidies for agricultural organizations of agriinnovation system. It is calculated as a ration of total amount of subsidies per billion rubles of GRP.

The third group describes the entrepreneurship in agriinnovation system. we included the following indicators into this group.

11. The share of all innovative organizations in the total amount of agricultural organizations.

12. The share of technologically innovative organizations in the total amount of agricultural organizations.

13. The share of market innovative organizations in the total amount of agricultural organizations.

14. The average amount of fertilizers per hectare of arable land.

15. The average amount of machinery per hectare of arable land.

16. External investments. The indicator is measured as total amount of extra regional investments to agricultural organizations per million of GRP.

17. The yield of agricultural products (grain)

18. The yield of agricultural products (potatoes)

19. The yield of agricultural products (vegetables)

The fourth group of indicators is aimed to depict the innovation infrastructure. We included the following indicators into this group:

20. The accessibility of information databases of scientific results in the field of agricultural production and food consumption.

21. Total length of roads. The purpose of this indicator is to evaluate the transport infrastructure needed for innovative development of rural territories.

22. Investment climate for agricultural organizations. It was evaluated by expert survey. Grades may change from 1 to 10. Grades more than 7 are treated as satisfactory.

23. Accessibility of food market for agricultural organizations. It was evaluated by expert survey. Grades may change from 1 to 10. Grades more than 7 are treated as satisfactory.

24. Accessibility of financial resources for agricultural organizations. It was evaluated by expert survey. Grades may change from 1 to 10. Grades more than 7 are treated as satisfactory.

25. Information provision of agriinnovation system agents. It is calculated as a ratio of total expenditures on information and information infrastructure to GRP.

The fifth group of indicators is dedicated to population of rural territories. It includes the following indicators:

26. The growth of rural inhabitants.

27. The change of rural unemployment.

28. The ratio of average income per capita in rural territories and average income in the region.

For the purpose of unification of indicators all indicators were standardized. The range was chosen in between 1 and 10. "1" stands for the lowest level of development, and "10" for the highest. Standardized values were calculated by this formula:

$$I_i = \begin{cases} 0, x_i < x_{min} \\ 9\left(\frac{x_i - x_{min}}{x_{max} - x_{min}}\right) + 1, x_{min} < x_i < x_{max} \\ 10, \ x_{max} < x_i \end{cases} \quad (1)$$

$$x_{max} = \bar{x} + 3\sigma$$

$$x_{min} = \bar{x} - 3\sigma$$

To estimate the relevance of the concept of the agriinnovation system to food supply improvement, let us discuss the case of Arctic Urals, using the statistical data provided by the *Goskomstat*, the Russian census office. Unfortunately, statistical data on food supply and agricultural production in Russia is limited, and it makes it more difficult to extrapolate the results to any Russian regions.

3. Empirical model: The case of Arctic Urals

Despite the diverse ethnic composition, most of the population follow the same highly nourishing northern diet (Hasnulin *et al*, 2006), consisting mainly of proteins of animal and plant origin (approximately 80 g of animal fat and 50 g of vegetable fat daily).

Arctic Urals faces major demographic problems, predominantly in the rural areas; reduction in employment of the rural population; decreases in the volumes of agricultural production; and, also, decreases in the standards of living in the rural territories.

The unemployment level in the rural localities of this first type is characterized by the following negative trends:

1. Persistently low earnings: on the one hand, the growing demand for low-paid labor; and, on the other hand, the unwillingness of local residents to work for the salaries offered (about 60 euros per month);

2. An increase in off-the-record employment, without taxes and social security benefits;

3. Insufficient demand for qualified workers and a scarcity of a qualified labor force in the local labor markets, due to the poor professional qualifications of rural residents and their low level of working mobility;

4. A significant proportion of young people (aged 20-30) with low general education levels, which considerably complicates the problem of their job placement; and

5. Increasing tension in the labor market. The low level of competitiveness on the labor market, which characterizes certain population categories (young people without work experience, women with small children, the disabled), is caused by the objective hardening of employers' demands.

More than 25 thousand people, on average, were permanently unemployed in rural localities during the period of 2009-2014. The average level of unemployment in the rural localities was 3.5%.

Arctic Urals has a strong industrial background, with high concentrations of urban populations (the rural population makes up only 10% of the whole population). This situation requires highly intensified agricultural production, most of which consists of fresh produce.

According to the statistical data, the average number of workers for an industrial enterprise in the region is 140. For rural localities the most common type of enterprises is SME, (small and medium enterprises), with staff numbers of up to 100 people. These are enterprises linked to agricultural production and the forests industry; in order to support the economy of rural areas, regional and local authorities should give priority to SMEs.

Further, the agriinivation system index for Arctic Urals for the period 2000-2014 was calculated as it is presented in Table 1 and Figure 1. The analysis of findings leads us to the conclusion that the agriculture of Arctic Urals is implementing innovation trend of development. Indices of different elements in the beginning of the investigation period are diverse but by the end of the period they've become more similar. To explain this similarity the correlation analysis was applied. The correlation coefficients were calculated for various pairs of elements as it presented on Table 3. The correlation coefficient for the pair of elements of entrepreneurship and institutes is -0.9. This value can be explained by linking trends of entrepreneurship and institute development: degrading trends in entrepreneurship cause the appearance of the additional federal and local government support of agriculture. The correlation coefficient of entrepreneurship and population of -0.8 has to be explained that during the investigation period the rise of living standards of population caused the increase of imported food, creating the problems for local food producers.

To conclude the agriinnovation system index has proved to be the reliable and convenient tool for agrifood system development investigation.

To ensure the balanced development of rural localities by creating adequate living conditions, it is necessary to accomplish the following major tasks:

- create self-developing economic systems there;
- increase the attractiveness for migration to these rural localities.

In accordance with the Pareto condition, to raise the level of food security in Arctic Urals it is proposed to increase the welfare of the rural population by social development in rural localities and the economic growth of agricultural production. According to this suggested model, there should be additional funding from federal, regional and local authorities (and private investment), in order to increase the welfare not only of the separate categories of the population of Arctic Urals, but, practically speaking, for all population groups.

The efficiency of the suggested model should be evaluated, depending on its impact on the improvement of the social and economic situation in the rural localities of Arctic Urals: specifically, in a visible change in migratory processes and results. The effectiveness of the model can be evaluated, too, on a wider scale, since its realization positively influences not only the rural population, but also urban increases.

Table 1

Agriinovation system index of Arctic Urals (Russia)

Elements of agriinovation system	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Research and educational sector	4,2	4,4	4,7	4,8	5,0	5,0	5,1	5,1	4,6	4,8	4,7	4,8	4,7	4,6
Institutes of agriinnovation system	3,2	3,6	3,6	4,0	4,2	4,4	5,0	5,0	5,0	4,9	5,1	4,9	4,8	4,8
Entrepreneurship in agriinnovation system	5,5	5,3	5,5	5,2	5,2	5,1	4,2	4,4	4,6	5,1	5,0	4,9	4,8	4,8
Innovation infrastructure	3,0	4,0	4,2	4,4	4,7	5,0	5,2	5,3	4,5	4,6	4,7	4,7	4,7	4,7
Population	3,1	3,2	3,9	4,2	4,5	4,8	5,0	5,2	5,3	4,9	4,8	4,8	4,8	4,7
Total index	3,8	4,1	4,4	4,5	4,7	4,9	4,9	5,0	4,8	4,8	4,9	4,8	4,8	4,7

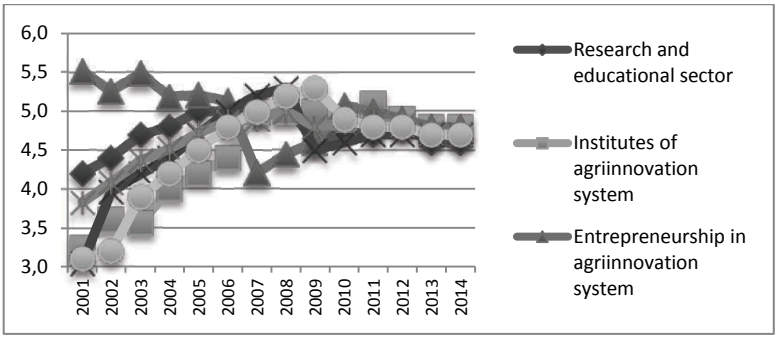

Fig.1. Agriinovation system index of Arctic Urals (Russia)

Table 2

Correlation between agriinnovation system elements indices of Arctic Urals (Russia)

Element of agriinnovation system	Elements of agriinnovation system	Correlation coefficient
Entrepreneurship in agriinnovation system	Research and educational sector	-0,58
Entrepreneurship in agriinnovation system	Institutes of agriinnovation system	-0,9
Entrepreneurship in agriinnovation system	Innovation infrastructure	0,7
Entrepreneurship in agriinnovation system	Population	-0,8
Institutes of agriinnovation system	Research and educational sector	0,67
Institutes of agriinnovation system	Innovation infrastructure	0,82
Institutes of agriinnovation system	Population	0,95
Research and educational sector	Innovation infrastructure	0,94
Research and educational sector	Population	0,76
Innovation infrastructure	Population	0,9

4. DISCUSSION

The suggested model can be considered suitable for the agro-innovation system of an industrial northern region, since the principles which this model is based on are fundamental for any industrial region.

The expected outcome, after the realization of the agro-innovation model, is an increase in food security and an improvement of living standards for the rural population. To achieve this, the following principles should be realized:

The first principle is that the agro-innovation system must consider the interests of all social groups of the given industrial region, and it has to be aimed at increasing the public welfare of all groups.

Secondly, the model has to be targeted at the development of the specific advantageous features of the agricultural producers of Arctic Urals , but not at the expense of competition with external producers.

The third principle is that, rather than focusing on changes in benchmarks for the development of Arctic Urals, the model should strengthen the economic growth of the region by improving food quality for the population.

The fourth principle is that the model develops not only the economic potential of the rural territories but, primarily, social growth. The model points out the importance of the multifunctional development of rural localities, which, in turn, is bound to affect the standards of living in the rural localities in Arctic Urals.

This model of a regional agro-innovation system was introduced to the local government, and it was found to be promising as a mandatory part of the regional innovative development program.

The weakness of the suggested model is a possible lack of political initiative on the part of local authorities (Kirsti Stuvøy, 2014). The current political system in Russia does not give sufficient power to municipal administrations. In order to implement this model municipal administrations are required to take political responsibility for the level of living standards and food security of the population.

Increase in migration to rural localities, stimulated by creating jobs in agrifood enterprises, and the creation of a favorable rural community, will lead to long-term stable regional economic development (Sergei Shubin, 2006). Thus, the agrifood system model developed for Arctic Urals meets the basic requirements for a model of an agro-innovation system of industrial regions and can be applied in other northern industrial regions of the Russian Federation.

5. CONCLUSION AND RECOMMENDATIONS

The research results revealed a deteriorating trend in agricultural production and rural social development in Arctic Urals. To reach the goal of maintaining regional food security and to address the issue of the downward trend in food production it is necessary to ensure the priority of social goals over economic development. Providing higher standards of rural livelihood will inevitably lead to the sustainable development of agricultural production. Our study determined the

conceptual foundations of sustainable development of rural localities of the Russian industrial regions, to be accomplished through the creation of decent living conditions and the participation of the rural population in quality food production. Particular attention is given to the mechanism of interaction and coordination among federal and regional governments, local governments and commercial organizations engaged in food production in rural areas. On the basis of the described theoretical propositions, the conceptual model of the innovative development of rural areas in Arctic Urals, aimed at quality food production for the population of region, is presented.

The results show that despite a highly centralized economic policy in the Russian Federation, regional food security and rural development can be achieved by encouraging municipal authorities and entrepreneurs to take on a more responsible and active role.

To ensure the entrepreneurial activities of rural producers, the regional government is encouraged to transform the regional agrifood system into an agro-innovation system, with information systems at its core.

A question for further research of the concept of agriinnovation systems as an aid to improve the rural development and the food supply for the population of northern regions of Russia depends on the availability of further reliable statistical data on agricultural production and food consumption in different regions of the country.

References

1. Abernathy W., Clark K.B. (1985) Mapping the winds of creative destruction. Research Policy, 14:3-22.
2. Aleksandrova L, Kireyeva N. (2012) Economy of supply or economy of demand? Strategy of ensuring food security of a region in the new realities. Regional Agrosystems: Economics and Sociology. 2: Retrieved from: http://iagpran.ru/journal.php?tid=281.
3. Anfinogentova A. (2013) Food security in Russia: state, challenges and conditions //Regional Agrosystems: Economics and Sociology. 1: Retrieved from: http://iagpran.ru/journal.php?tid=307.
4. Arrow K. A. (1950) Difficulty in the Concept of Social Welfare// The Journal of Political Economy. 58: 328-346.
5. Boycko M., Shleifer A., Vishny R. (1995) Privatizing Russia. – Cambridge: MIT Press:165 p.
6. Brunori, Gianluca and Fabio Bartolini Local Agri-food Systems in a Global World: Market, Social and Environmental Challenges Eur Rev Agric Econ (2013) 40 (2): 408-411 doi:10.1093/erae/jbt002.
7. Goldman M. I. (1992) Lost Opportunity: Why Economic Reforms in Russia Have Not Worked. - New York – London: W.W. Norton &Company: 320 p.

8. Gregory P. R. (1990) Restructuring the Soviet economic bureaucracy. – Cambridge: Cambridge University Press: 196 p.
9. Hasnulin V.I. (2009) Health, Northern Type of Metabolism and Fish Food Requirement Allowances in the North. Retrieved from: www.iea.ras.ru/conferences/2009/medanrtho_summer_school?programme.html.
10. Hasnulin V.I., E Wilhelm, V.G. Selyatitskaya (2006) The Ethno-ecological Aspects of the Natives Vital. Proceedings of the 13th international congress on circumpolar health. Novosibirsk, Russia: P. 117-118.
11. Hermans, Frans, Marian Stuiver, P.J. Beers, Kasper Kok, The distribution of roles and functions for upscaling and outscaling innovations in agricultural innovation systems, Agricultural Systems, Volume 115, February 2013, Pages 117-128.
12. Herzfeld, Thomas, Sonya Huffman, Marian Rizov, The dynamics of food, alcohol and cigarette consumption in Russia during transition, Economics & Human Biology, Volume 13, March 2014, Pages 128-143
13. Honkanen, Pirjo, Lynn Frewer, Russian consumers' motives for food choice, Appetite, Volume 52, Issue 2, April 2009, Pages 363-371.
14. Horlings, Lummina G. and Marsden, Terry Keith 2014. Exploring the 'New Rural Paradigm' in Europe: eco-economic strategies as a counterforce to the global competitiveness agenda. European Urban and Regional Studies 21 (1) , pp. 4-20. 10.1177/0969776412441934.
15. Klerkx, Laurens, Noelle Aarts, Cees Leeuwis, Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment, Agricultural Systems, Volume 103, Issue 6, July 2010, Pages 390-400.
16. Lamprinopoulou, Chrysa, Alan Renwick, Laurens Klerkx, Frans Hermans, Dirk Roep, Application of an integrated systemic framework for analysing agricultural innovation systems and informing innovation policies: Comparing the Dutch and Scottish agrifood sectors, Agricultural Systems, Volume 129, July 2014, Pages 40-54.
17. Lapteva L. (1996) Problems of Local Self-government in Russia // The Russian Review. 55(2):P. 317-325.
18. Porter M.E. (1990) The Competitive Advantage of Nations. - New York: Free Press: 855 p.
19. Shubin, Sergei The changing nature of rurality and rural studies in Russia, Journal of Rural Studies, Volume 22, Issue 4, October 2006, Pages 422-440
20. Spielman, David J. (2005) Innovation systems perspectives on developing-country agriculture: A critical review. – Washington, D.C.:IFPRI: 58 p.
21. Stuvøy, Kirsti Power and Public Chambers in the development of civil society in Russia, Communist and Post-Communist Studies, Volume 47, Issues 3–4, September–December 2014, Pages 409-419.

22. Temel, Tugrul, Willem Janssen, Fuad Karimov, Systems analysis by graph theoretical techniques: assessment of the agricultural innovation system of Azerbaijan, Agricultural Systems, Volume 77, Issue 2, August 2003, Pages 91-116.
23. Tregear, Angela, Filippo Arfini, Giovanni Belletti, Andrea Marescotti, Regional foods and rural development: The role of product qualification, Journal of Rural Studies, Volume 23, Issue 1, January 2007, Pages 12-22.
24. Wognum, P.M. (Nel) , Harry Bremmers, Jacques H. Trienekens, Jack G.A.J. van der Vorst, Jacqueline M. Bloemhof, Systems for sustainability and transparency of food supply chains – Current status and challenges, Advanced Engineering Informatics, Volume 25, Issue 1, January 2011, Pages 65-76.
25. World Bank Agribusiness and innovation systems in Africa / Kurt Larsen, Ronald Kim, and Florian Theus. World Bank, Washington, DC (2009).
26. World Bank Enhancing agricultural Innovation: How to Go Beyond the Strengthening of Research Systems World Bank, Washington, DC (2006), p. 118.
27. Zalivcheva O. (2013) Food consumption regional differentiation //Regional Agrosystems: Economics and Sociology: Retrieved from: http://iagpran.ru/journal.php?tid=309.